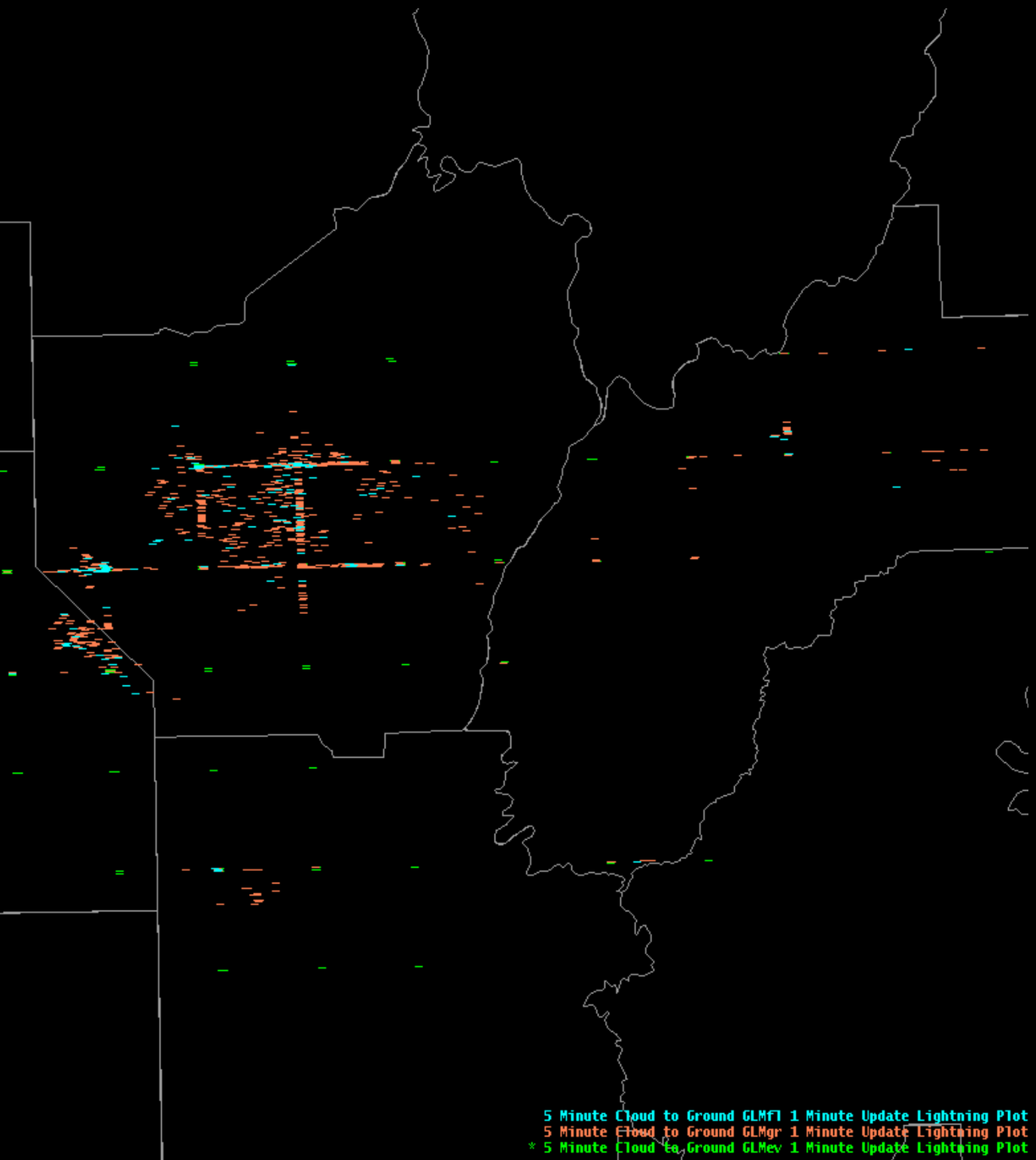
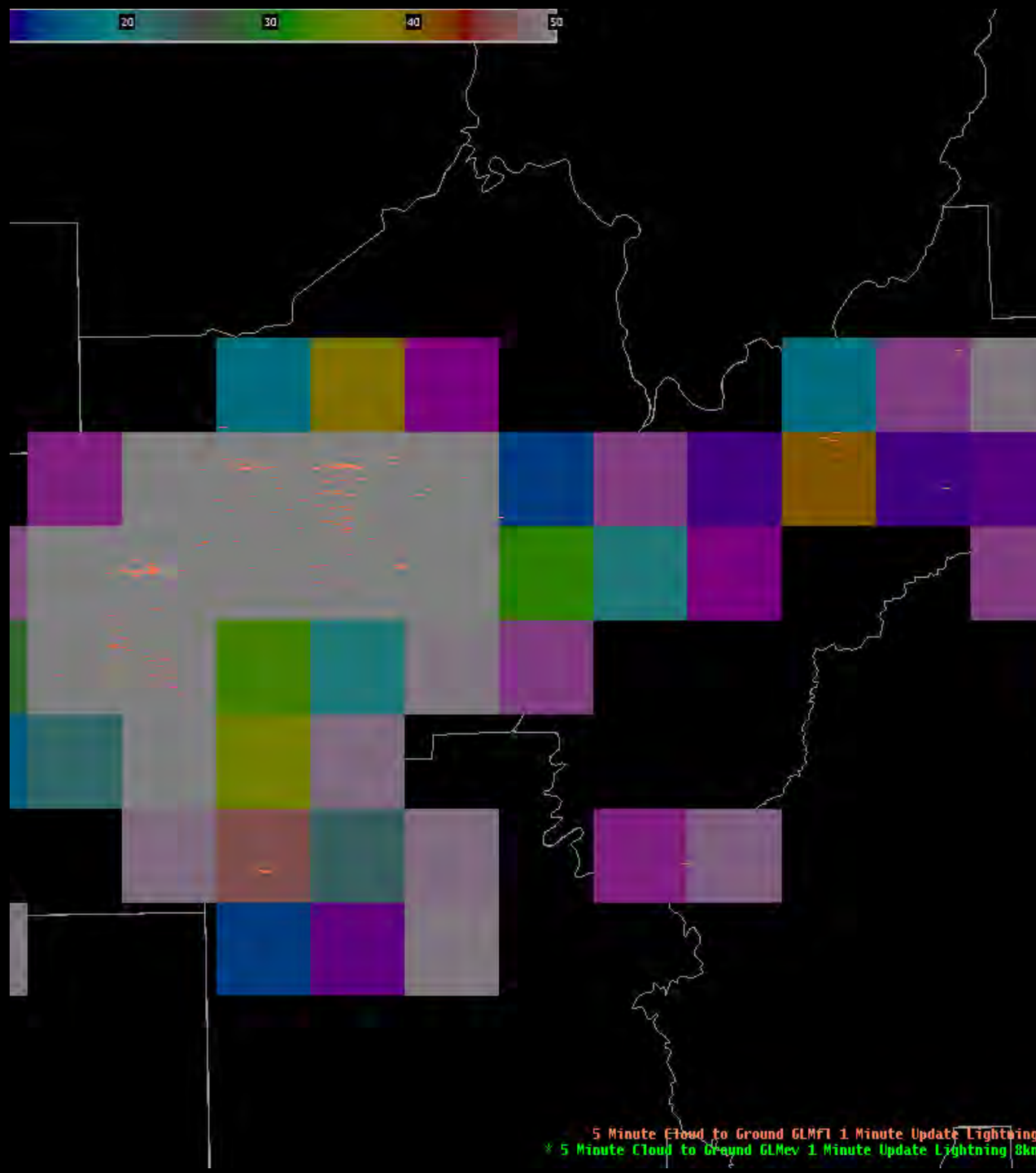
GLM IN THE HAZARDOUS WEATHER TESTBED AND GOES-R PROVING GROUND

KRISTIN M. CALHOUN, OU/CIMMS & NOAA/NSSL

OUR FIRST LOOK @

GLM IN AWIPS





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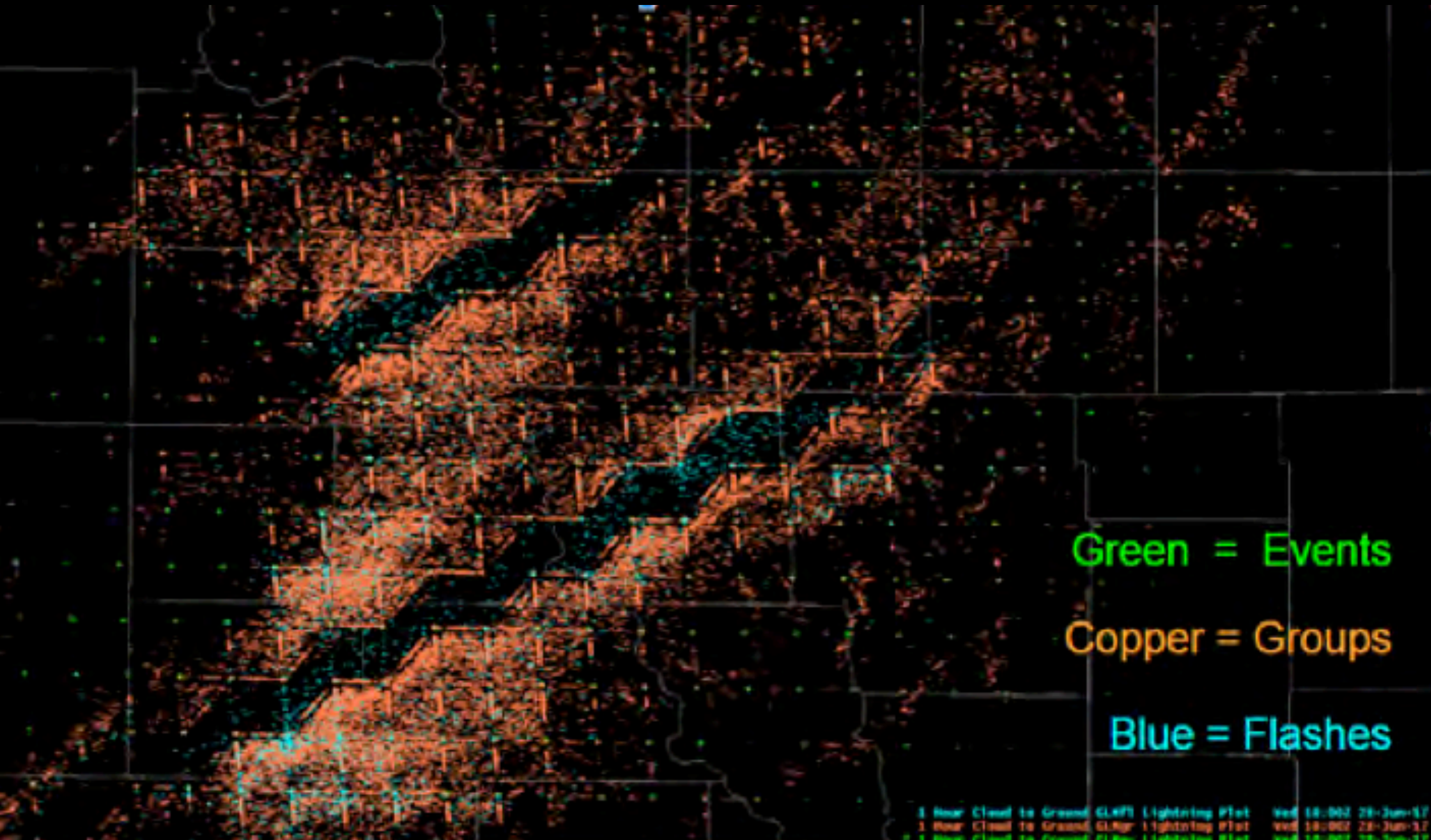


CRITICAL OT&E FINDINGS RELATED TO GLM DATA "THREE THINGS MEMO"

Combined HWT / NWS Proving Ground / SSD chiefs statement

1. AWIPS base visualizations were not appropriate for the data (pushed through cloud-to-ground ingest / display)

2. Geolocation errors and false detections caused confusion in data comparison & storm connections

3. Gridding in AWIPS does not match native resolution of the satellite

DATA SHOULD NOT BE MADE OPERATIONAL IN NWS UNTIL FIXED!

TO: Ming Ji (OSTI), David Michaud (OCP), Joe Pica (OBS), Andy Ster

DATE: July 10, 2017

FROM: Kim Runk (OSTI/OPG), Chad Gravelle (OPG GOES-R Liaison), Ma
Kristin Calhoun (NSSL/CIMMS Research Scientist), Tiffany Meye
Research Associate), Alan Gerard (NSSL/HWT), Geoffrey Stano (
Liaison), Andy Edman (WRH SSD), Greg Patrick (SRH SSD), Bruc
Ken Johnson (ERH SSD), Dave Radell (ERH/SSD), Greg Noonan

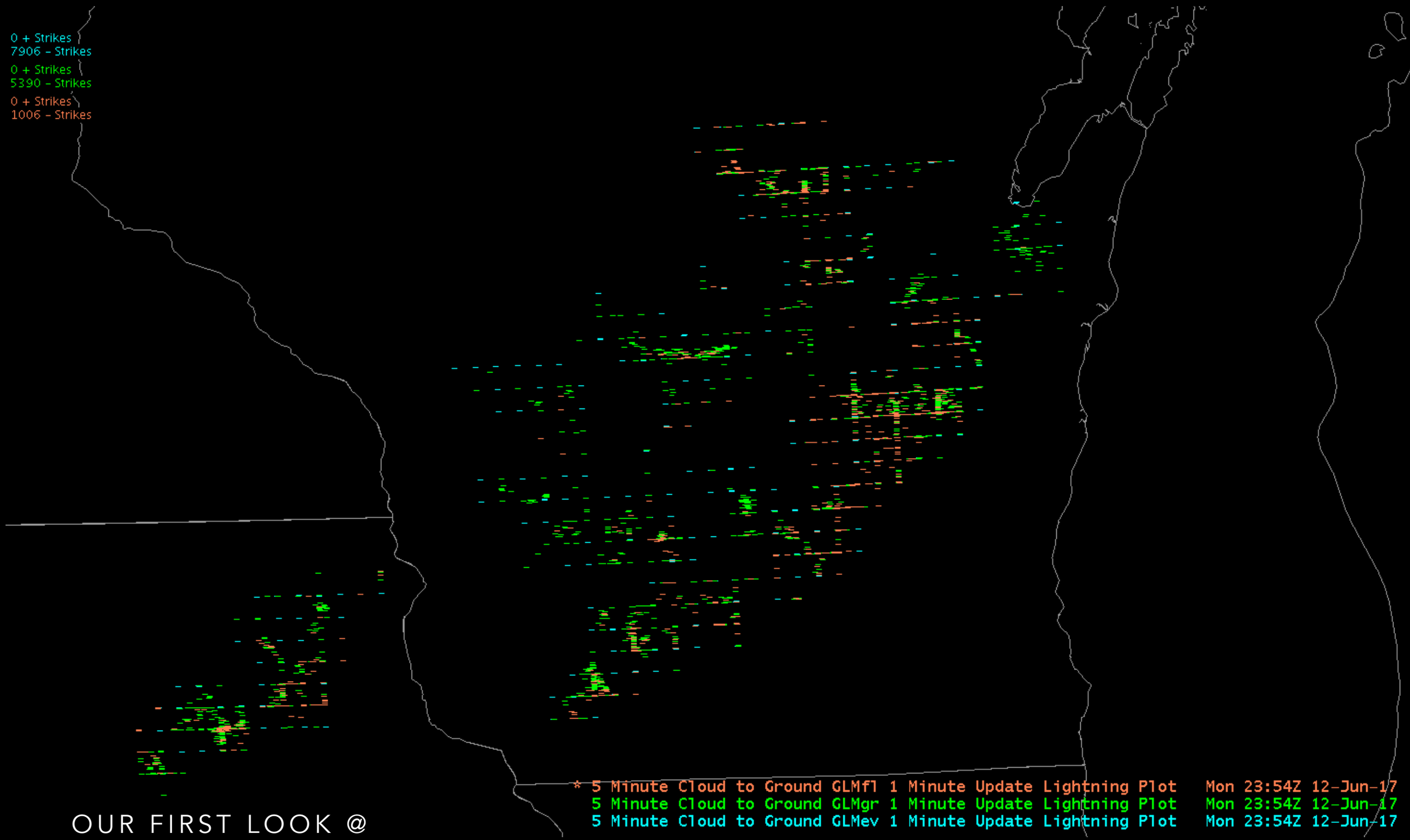
SUBJECT: ***Critical OT&E Findings Related to GOES-16 GLM Data***

Three Things You Must Know

1. NWS forecasters participating in the Hazardous Weather Testbed (HWT) GOES-R F
Experiment and the Operations Proving Ground (OPG) "Near Storm Environmental Aw
identified several significant anomalies with the GOES-16 Geostationary Lightning Ma
most critical issues, associated with errors in data processing, geo-location and naviga
GLM dataset with unacceptable data quality. Other issues are connected to mapping a
AWIPS. The GOES-R Foundational Training provided to NWS forecasters touted the G
which has the potential to transform support to service sectors such as fire weather pa
managers at public venues, and aviation traffic management. In addition, signals deriv
trends in experimental ground-based lightning mapping arrays (LMAs), a proxy to the G
as a precursor to severe thunderstorm development. In the future, the GLM may provi
advantages to areas without access to LMA data. However, some of the problems not
GLM data, as presented below, render them unusable for these purposes.

2. On July 5, 2017, the GOES-16 GLM Peer Stakeholder - Product Validation Review (
deemed the GLM data as having passed requirements to be declared "Beta" and thus
through the GOES Rebroadcast (GRB) system. Beta maturity, by definition, allows for
in the data – and the panel itself acknowledged several important issues related to cali
and position errors associated with using incorrect conversion units. However, it is not
any, will be resolved prior to releasing the data for distribution via the AWIPS Satellite
(SBN), which is currently scheduled for early August 2017.

3. If these data are released to the field without addressing the critical issues identified



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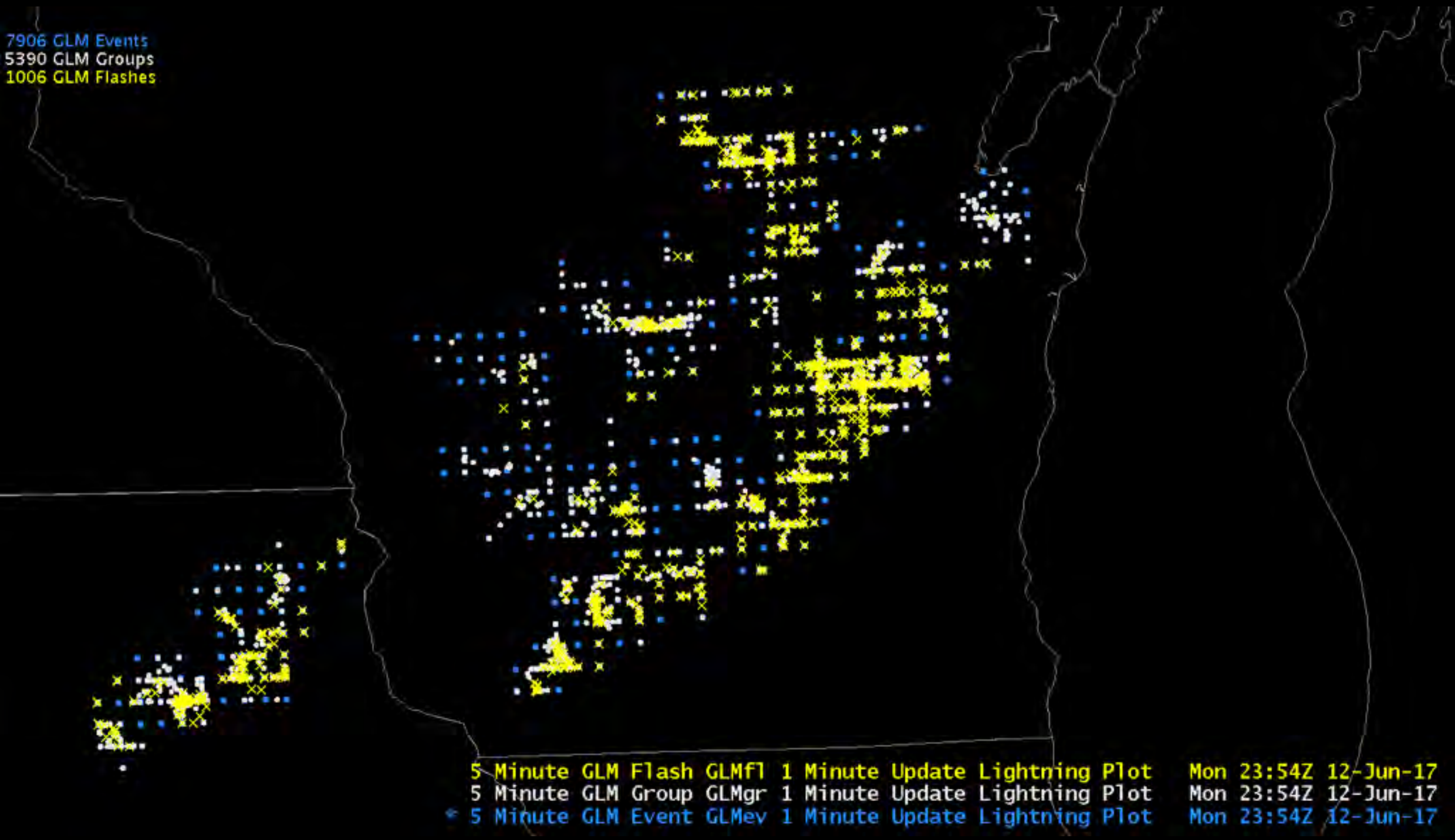
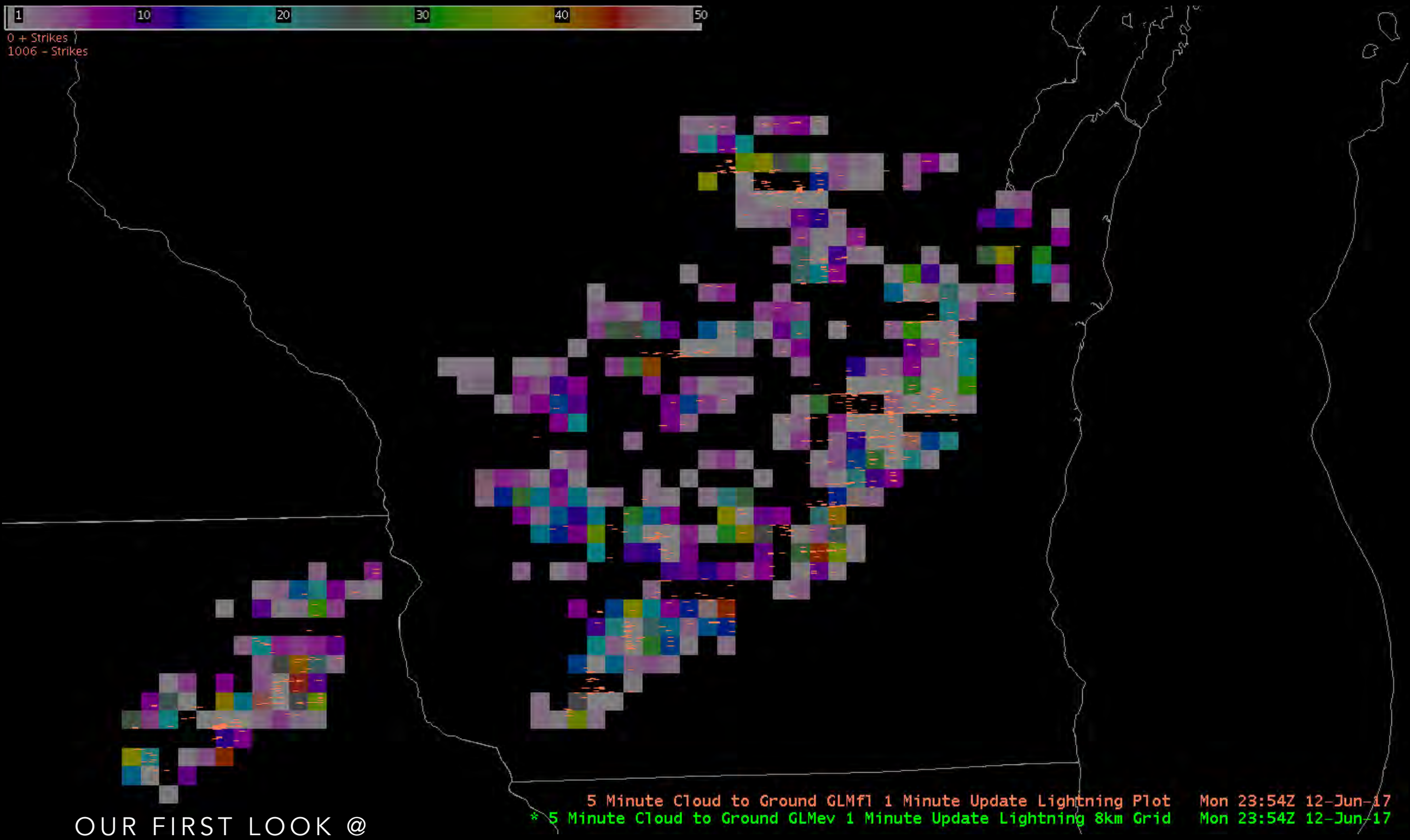


GLM IN AWIPS

IN THE HAZARDOUS WEATHER TESTBED



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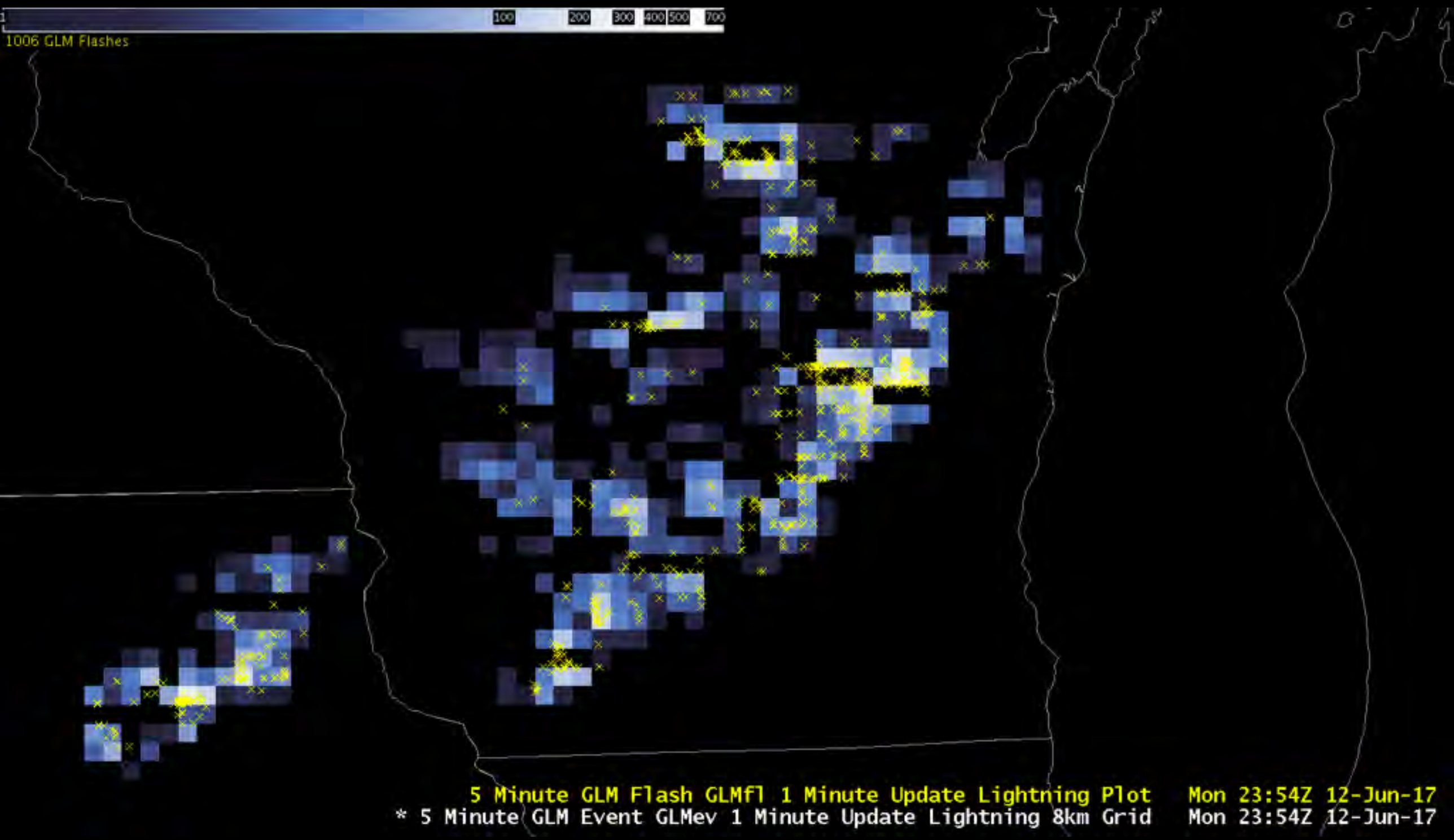

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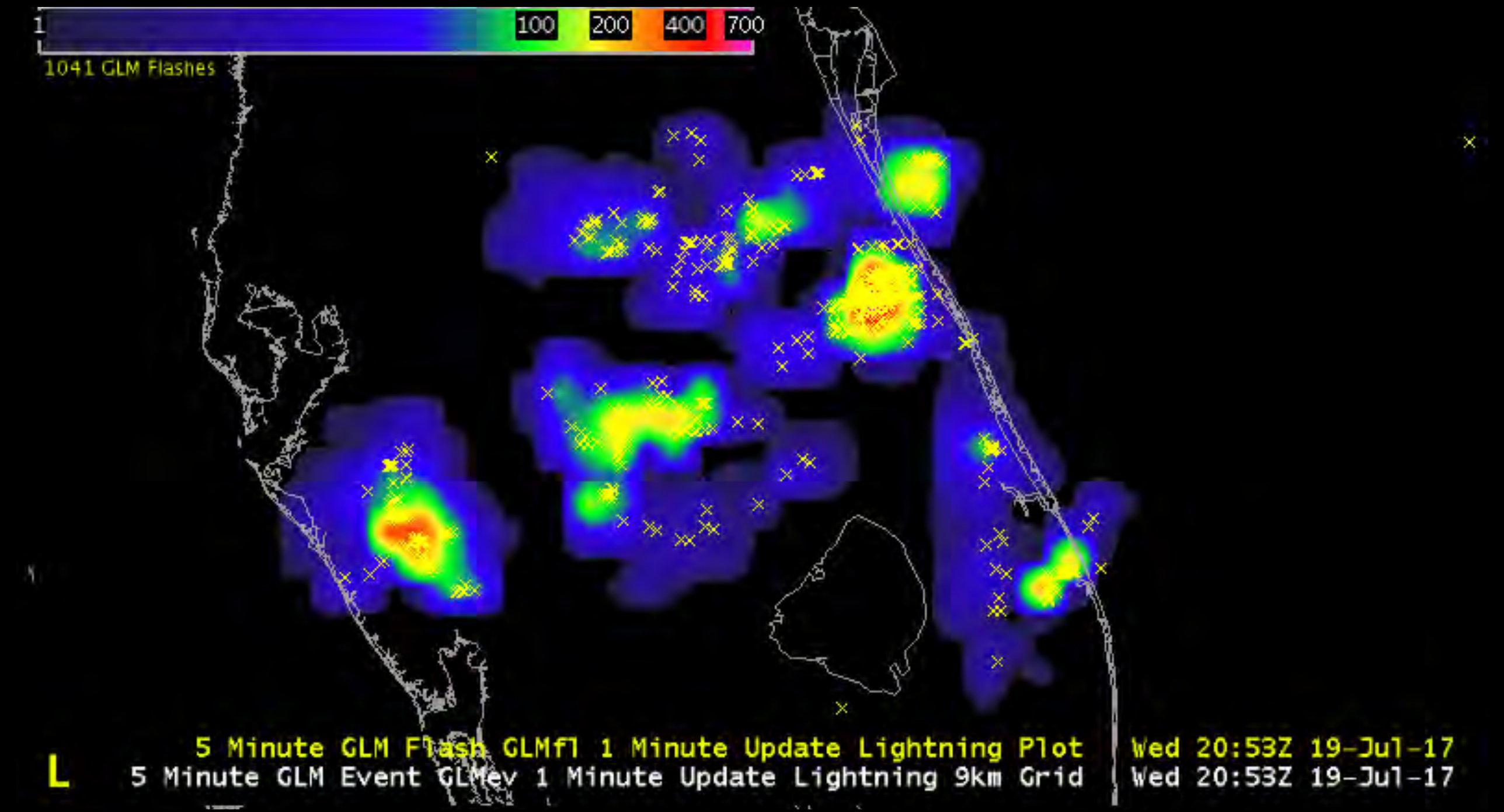

GLM IN AWIPS

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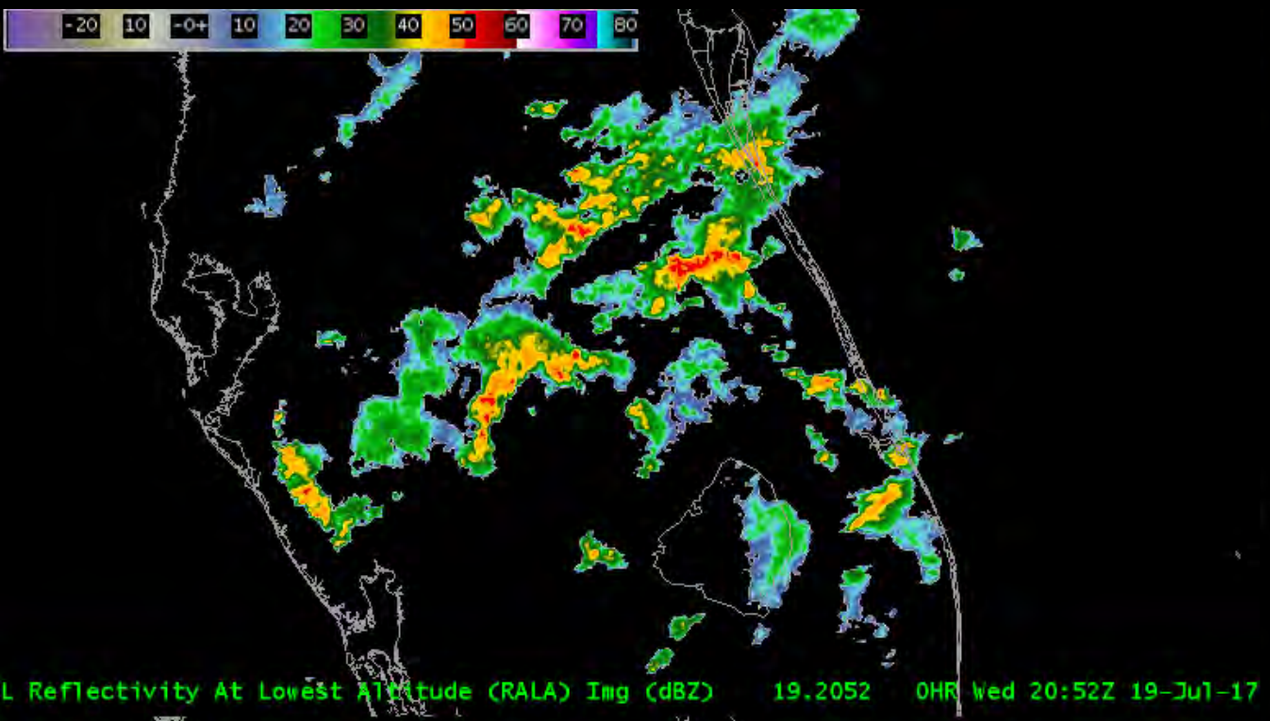
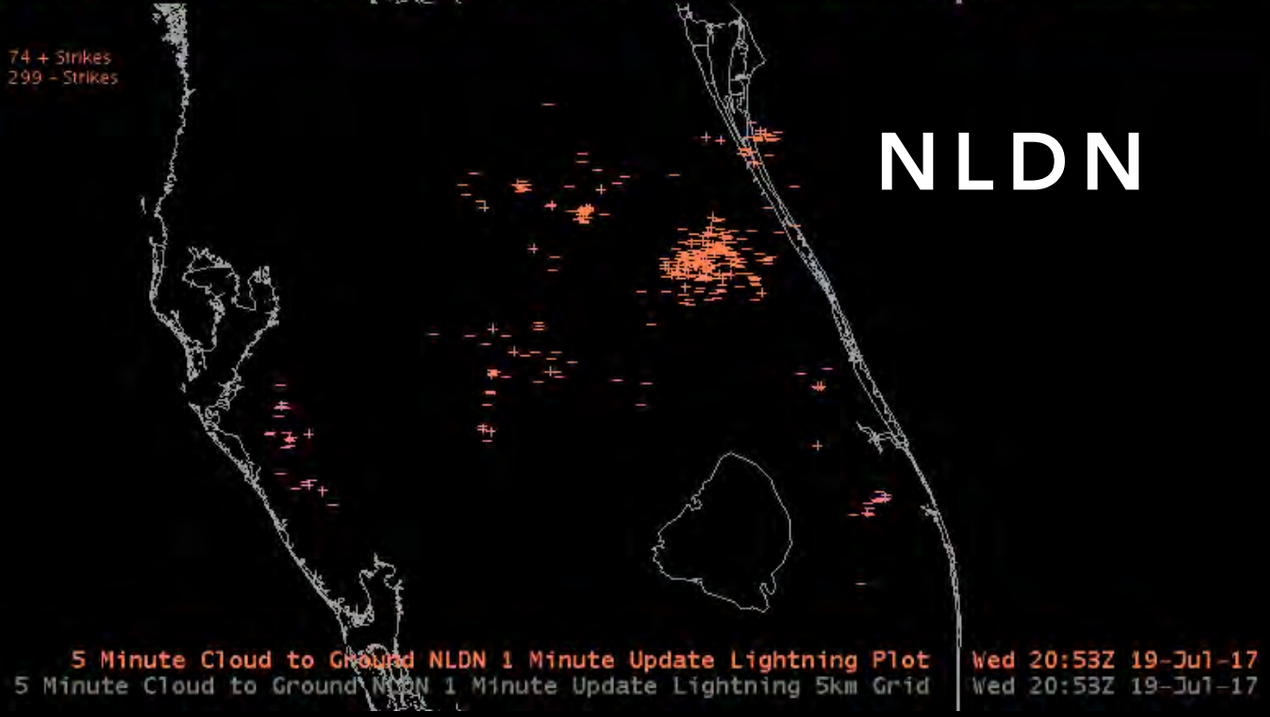
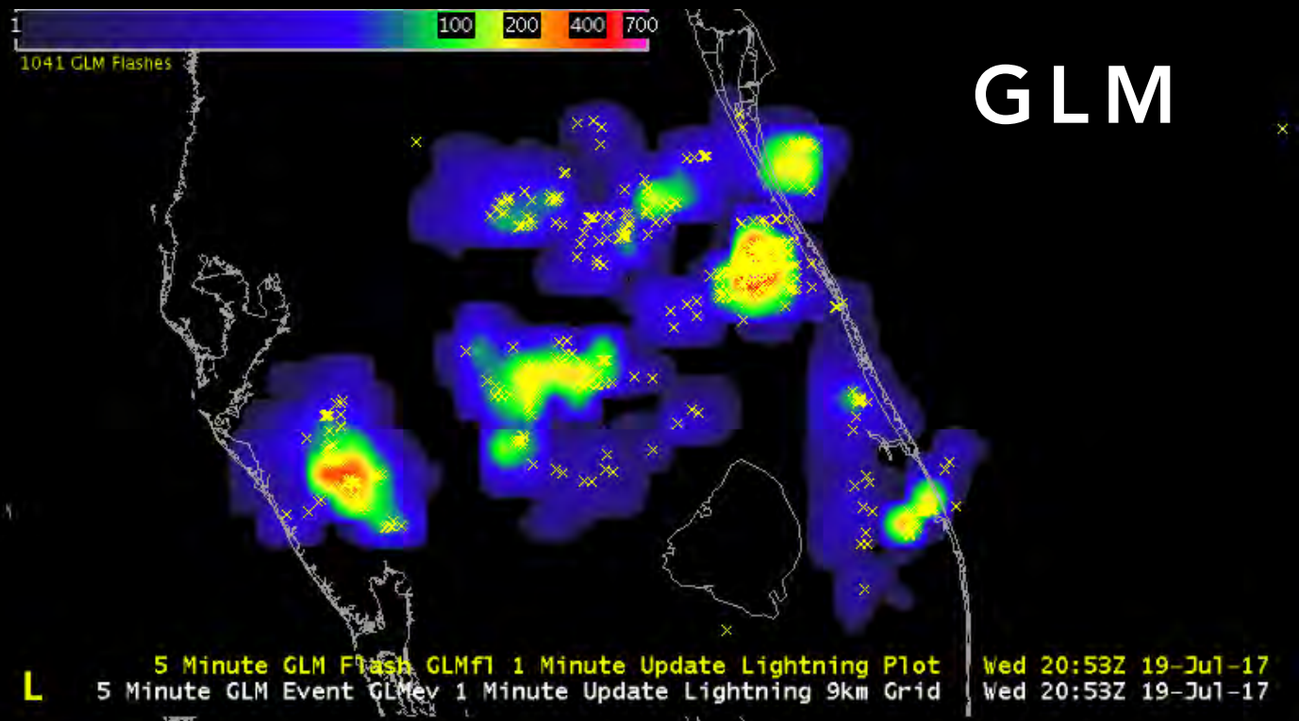




NLDN



GLM

ENTLN

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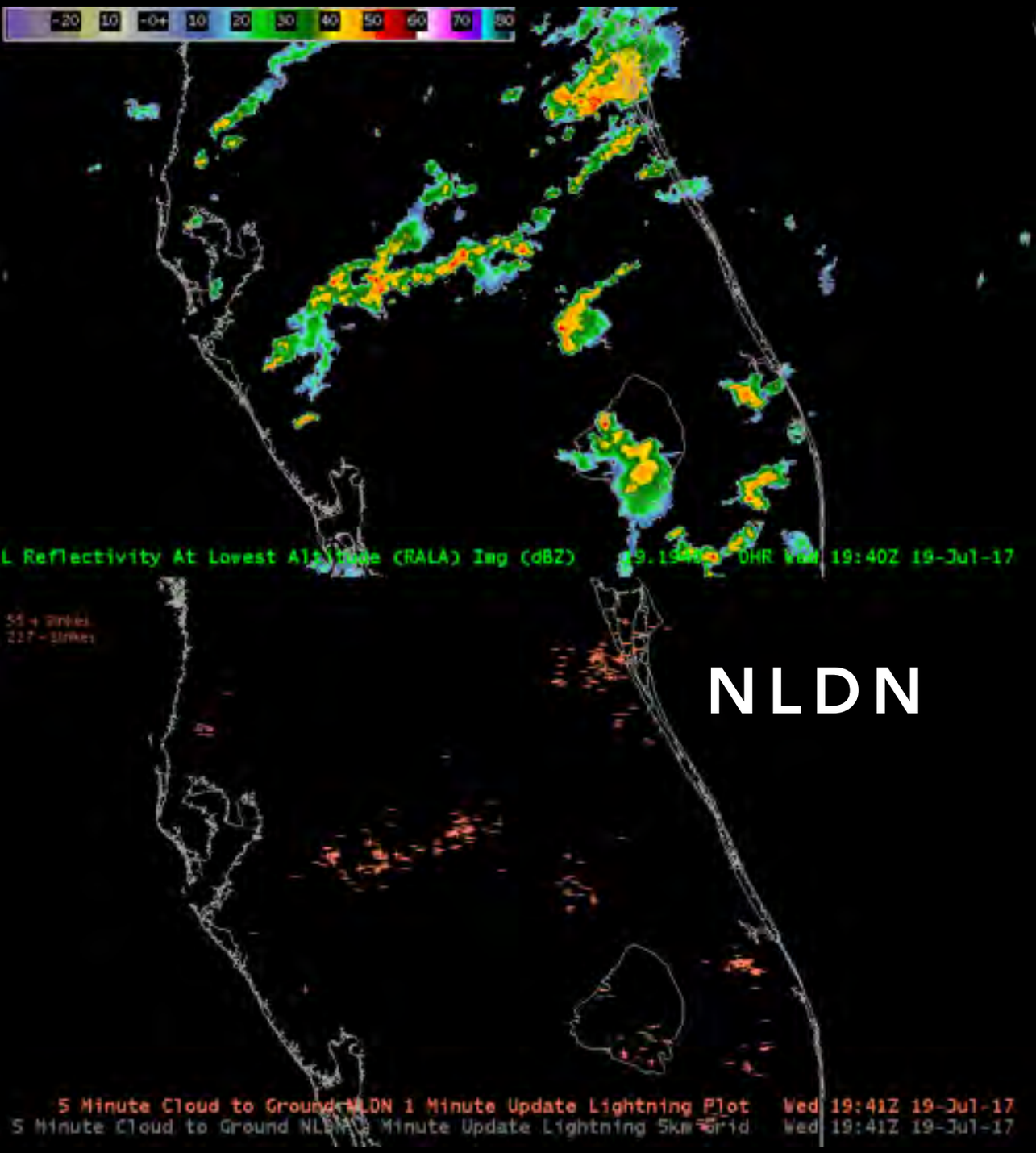
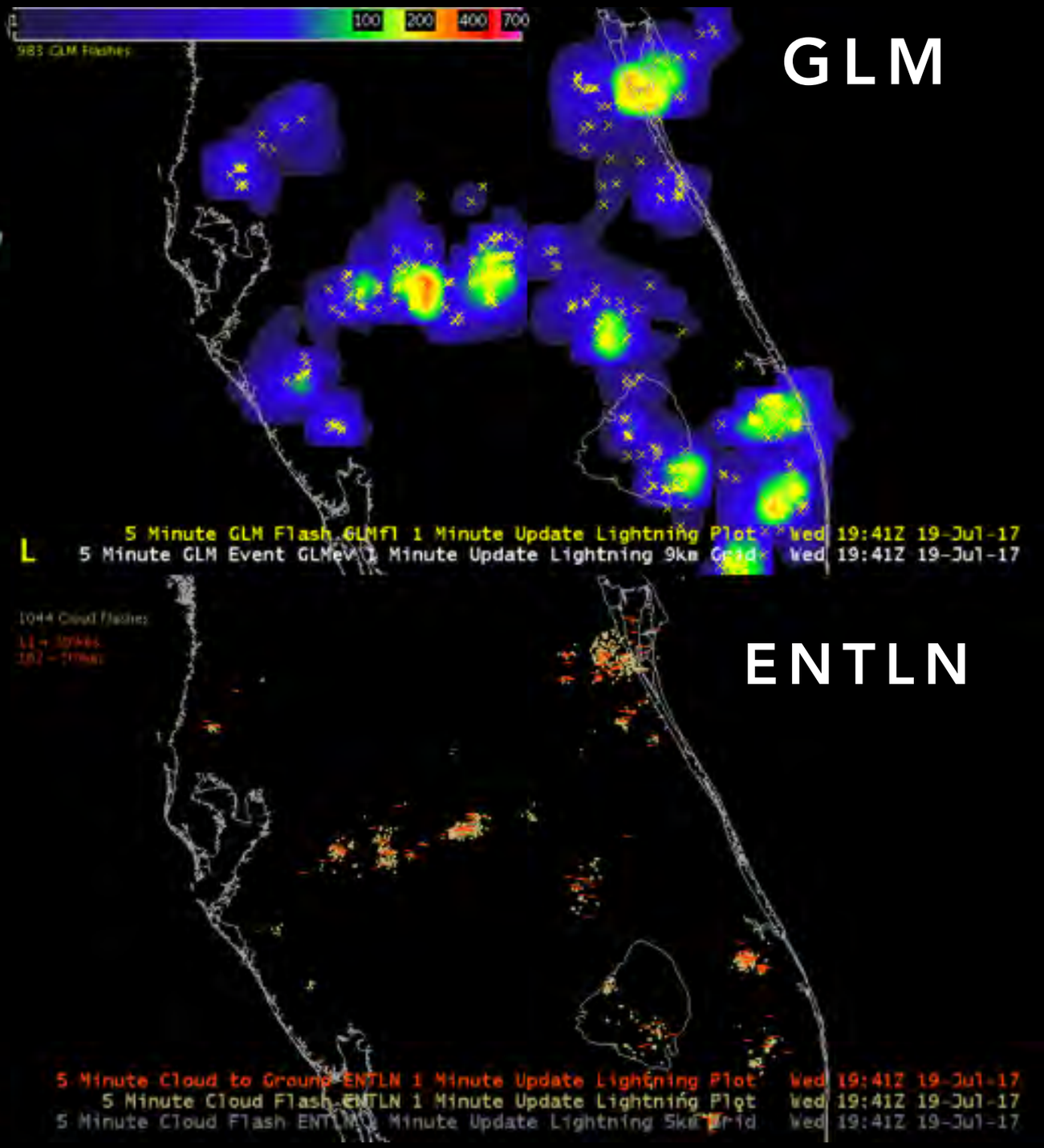


NLDN

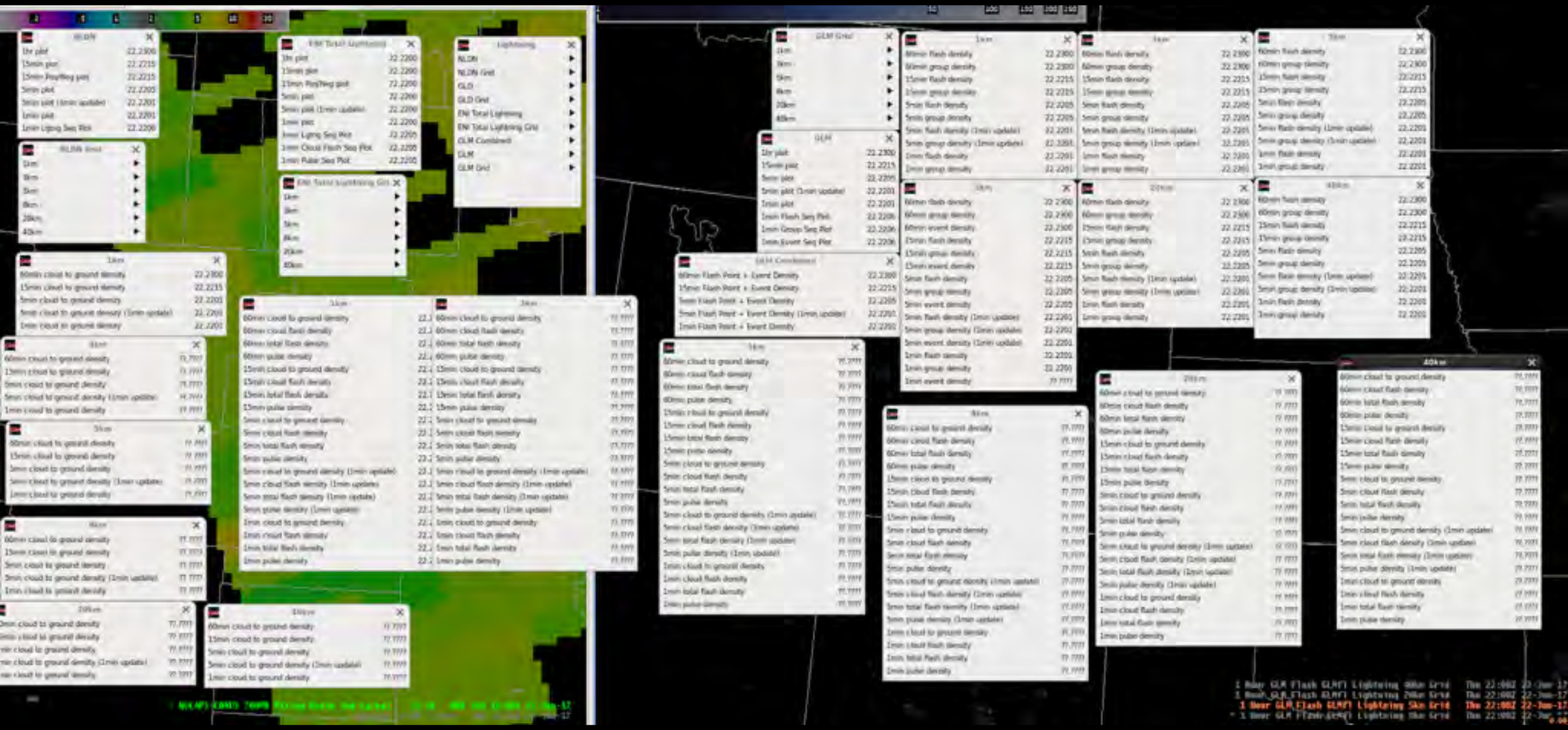


GLM

ENTLN

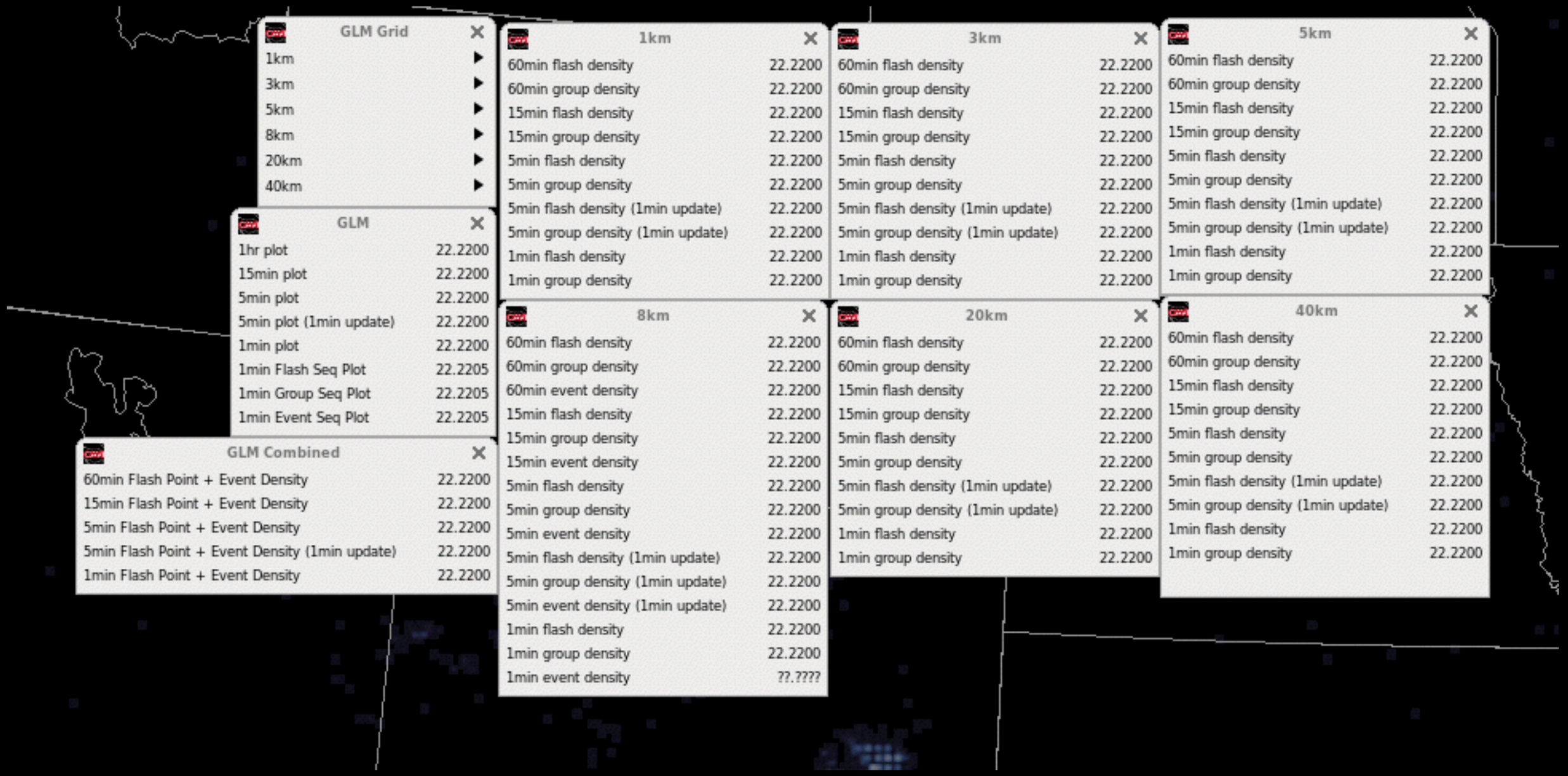
GLM IN AWIPS IN THE HAZARDOUS WEATHER TESTBED

GLM Lightning Menus in AWIPS



https://goesrhwt.blogspot.com/2017/06/lightning-menus-are-out-of-control.html

GLM Lightning Menus in AWIPS



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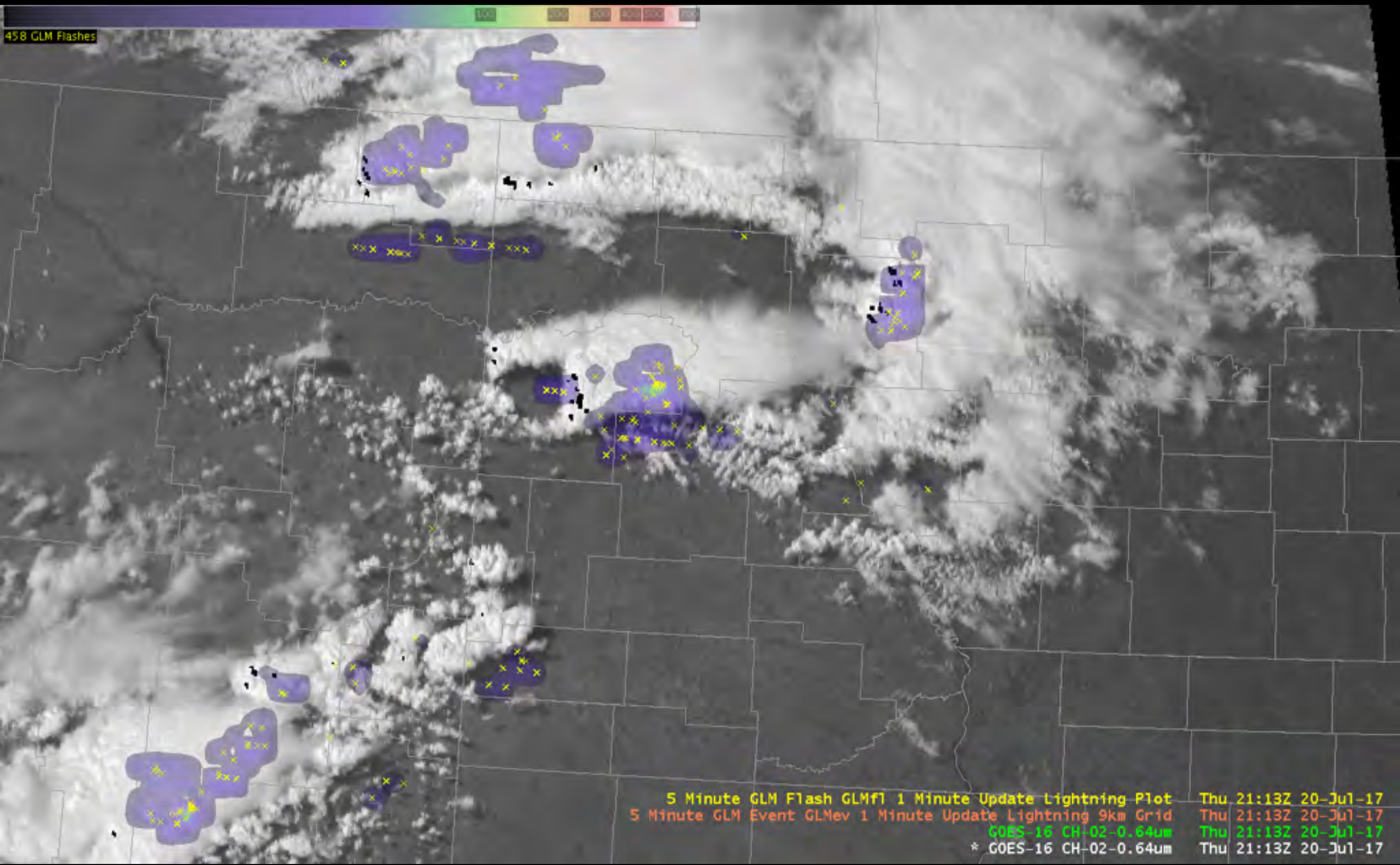
GEOLOCATION & CLOUD EDGE:



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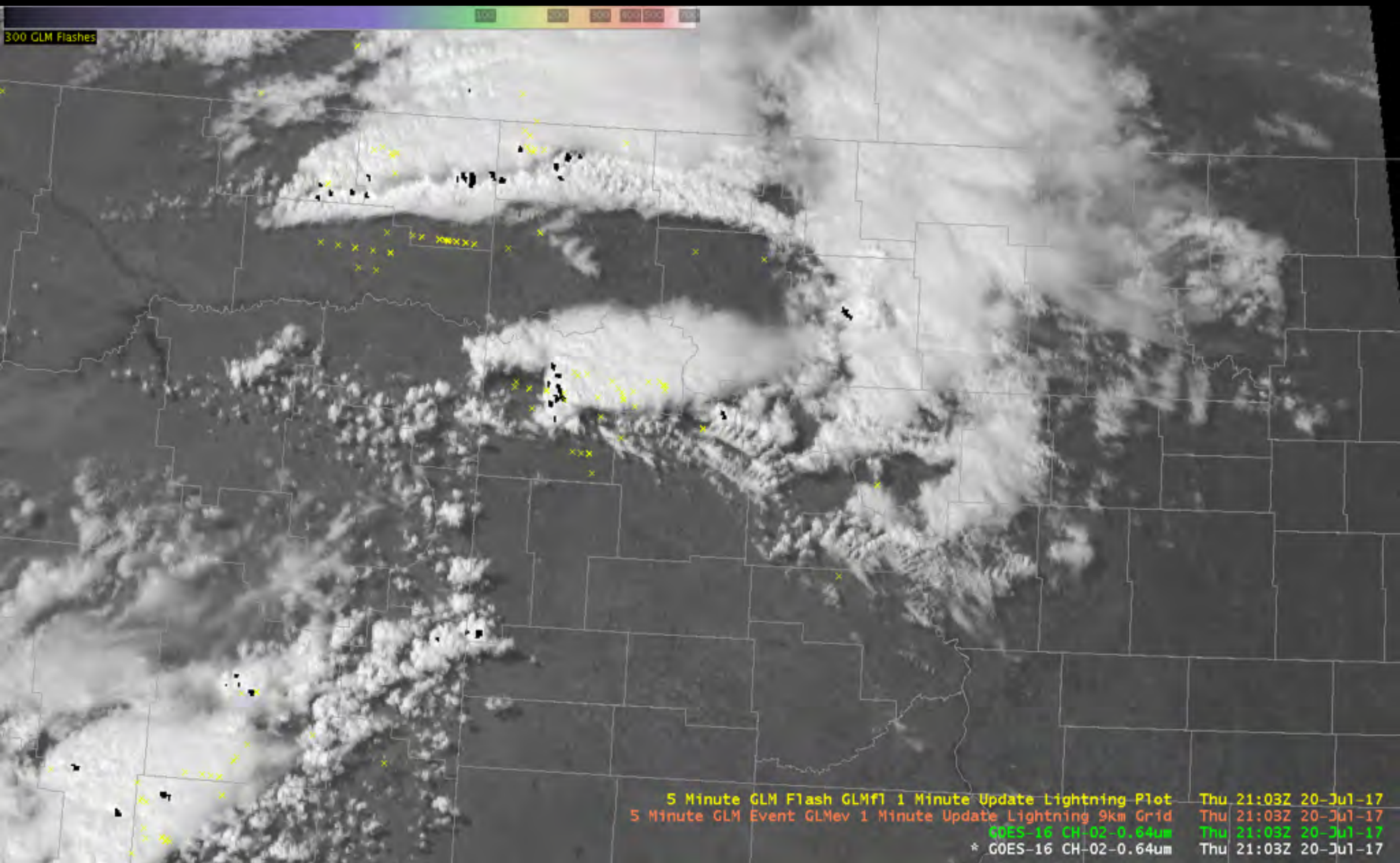
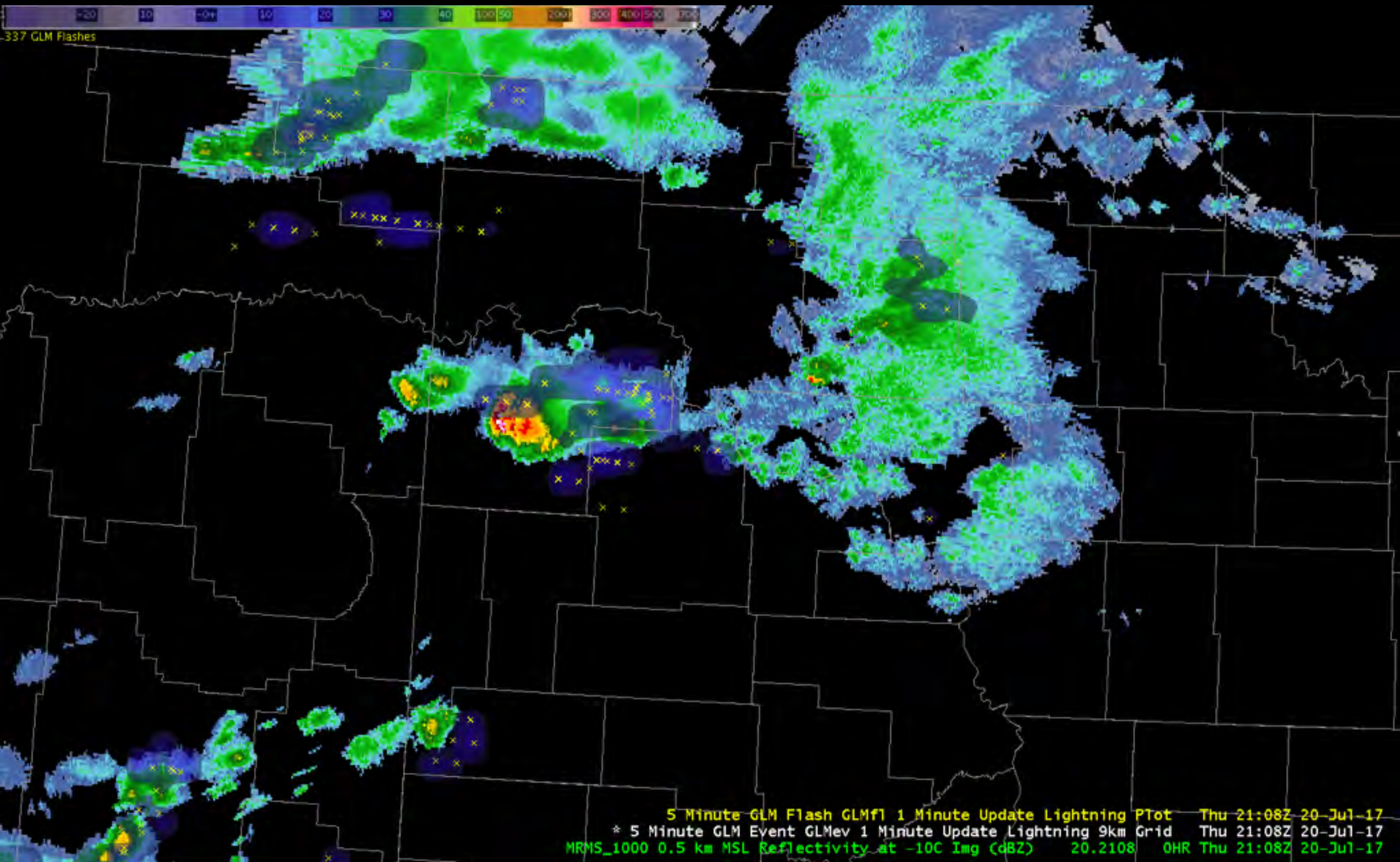
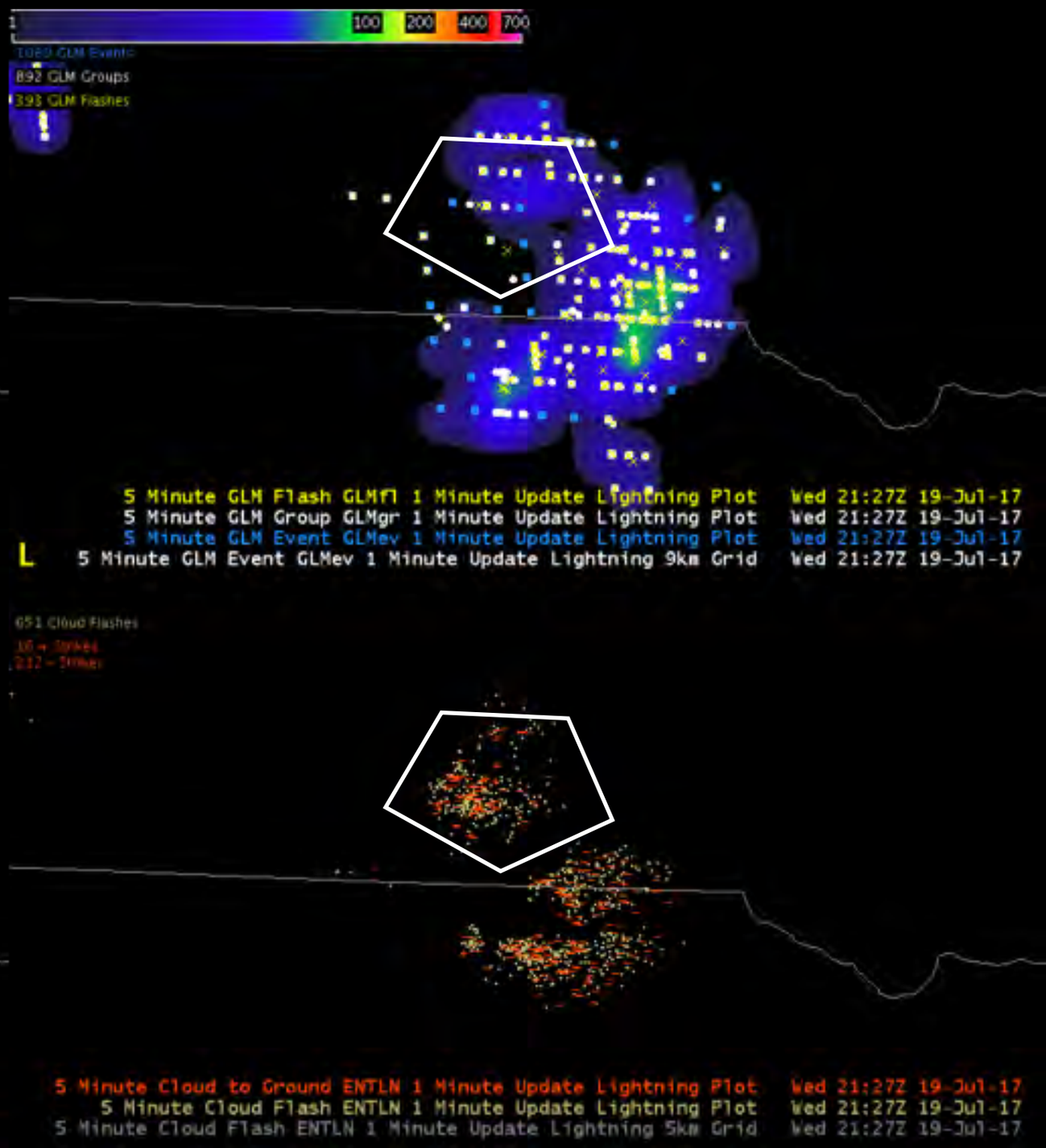


LOCATION & CLOUD EDGE:

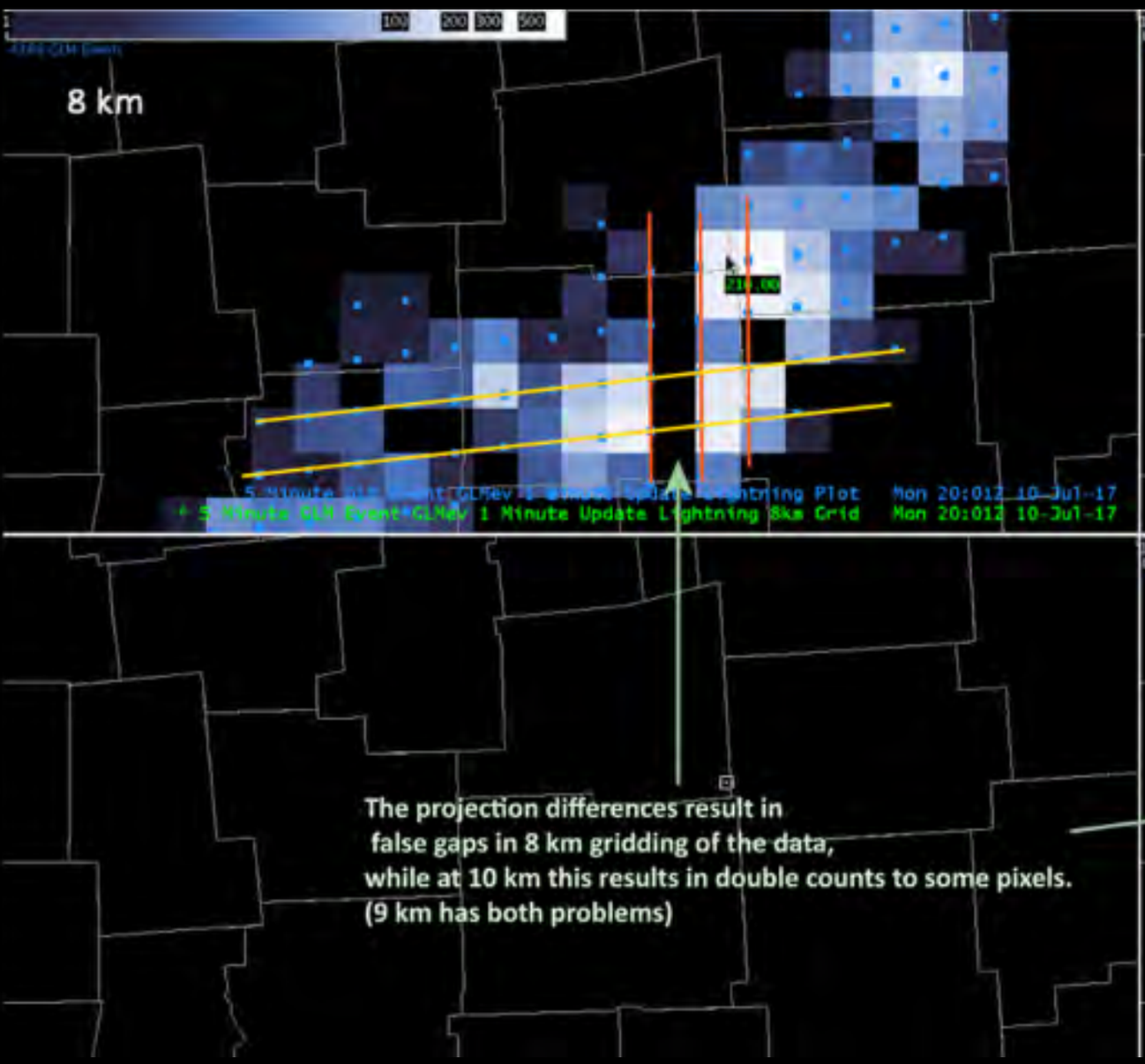


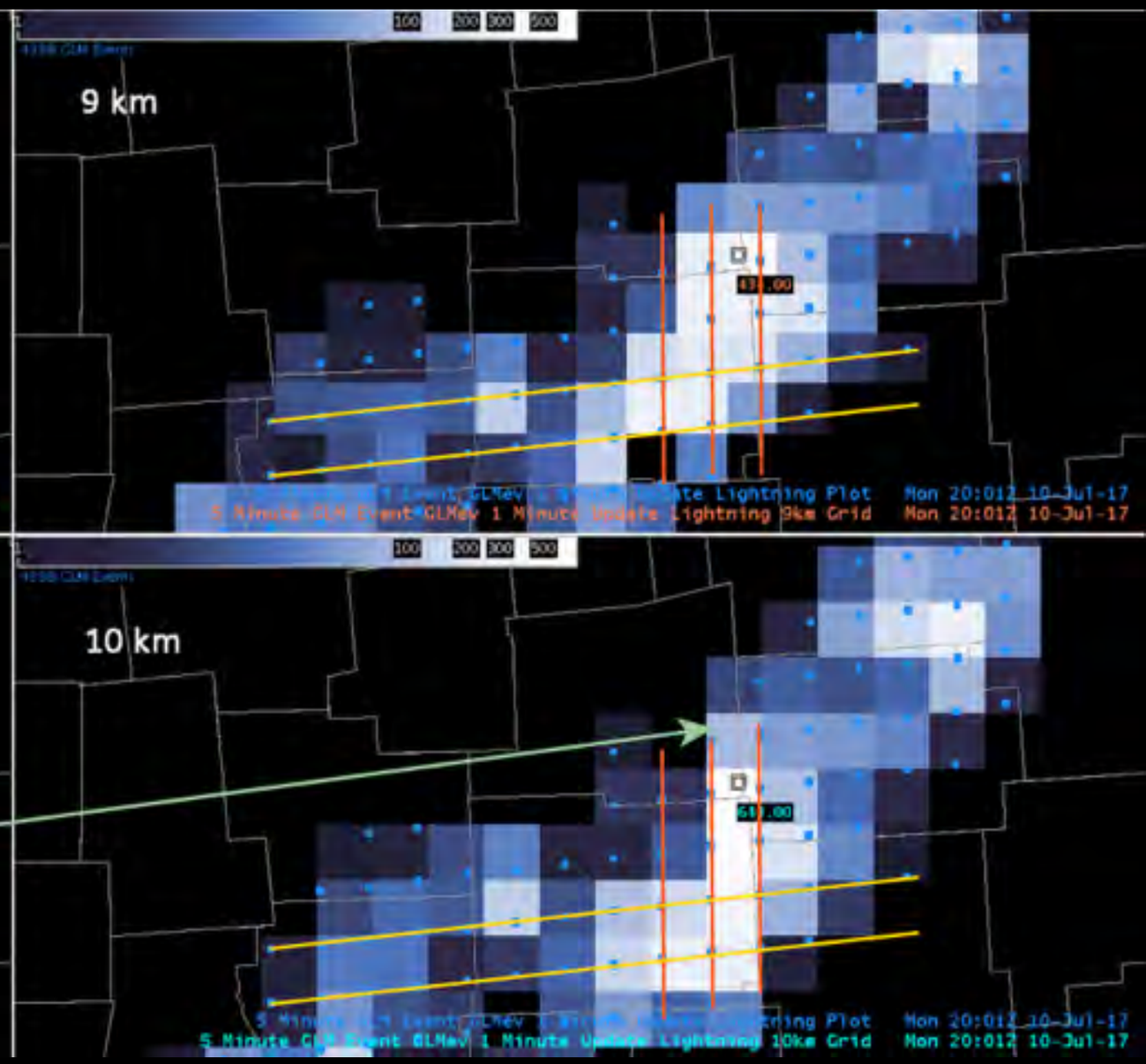
DETECTION EFFICIENCY QUESTIONS



STORM MATCHING / GEOLOCATION

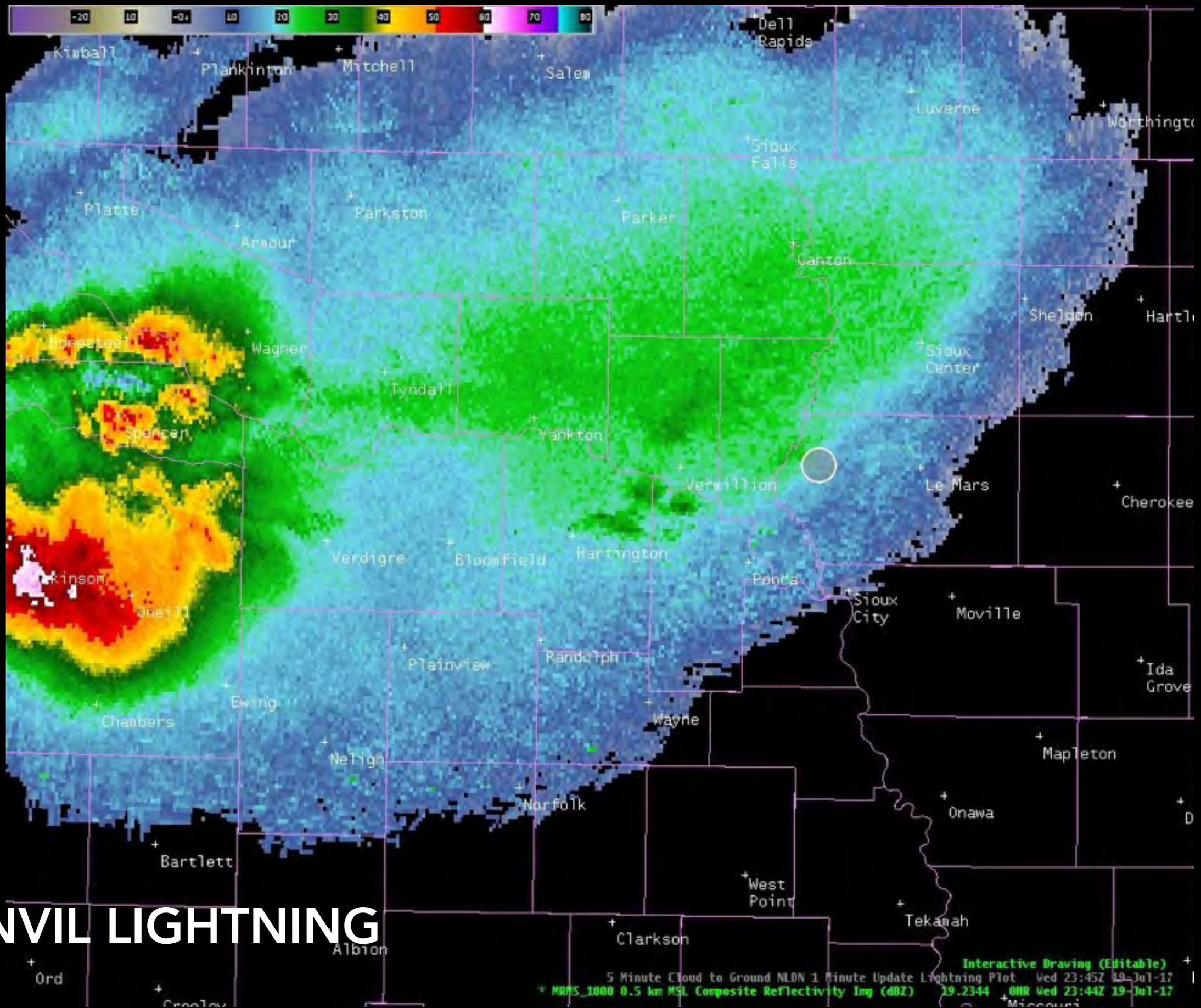
AWIPS GRIDDING PROBLEMS





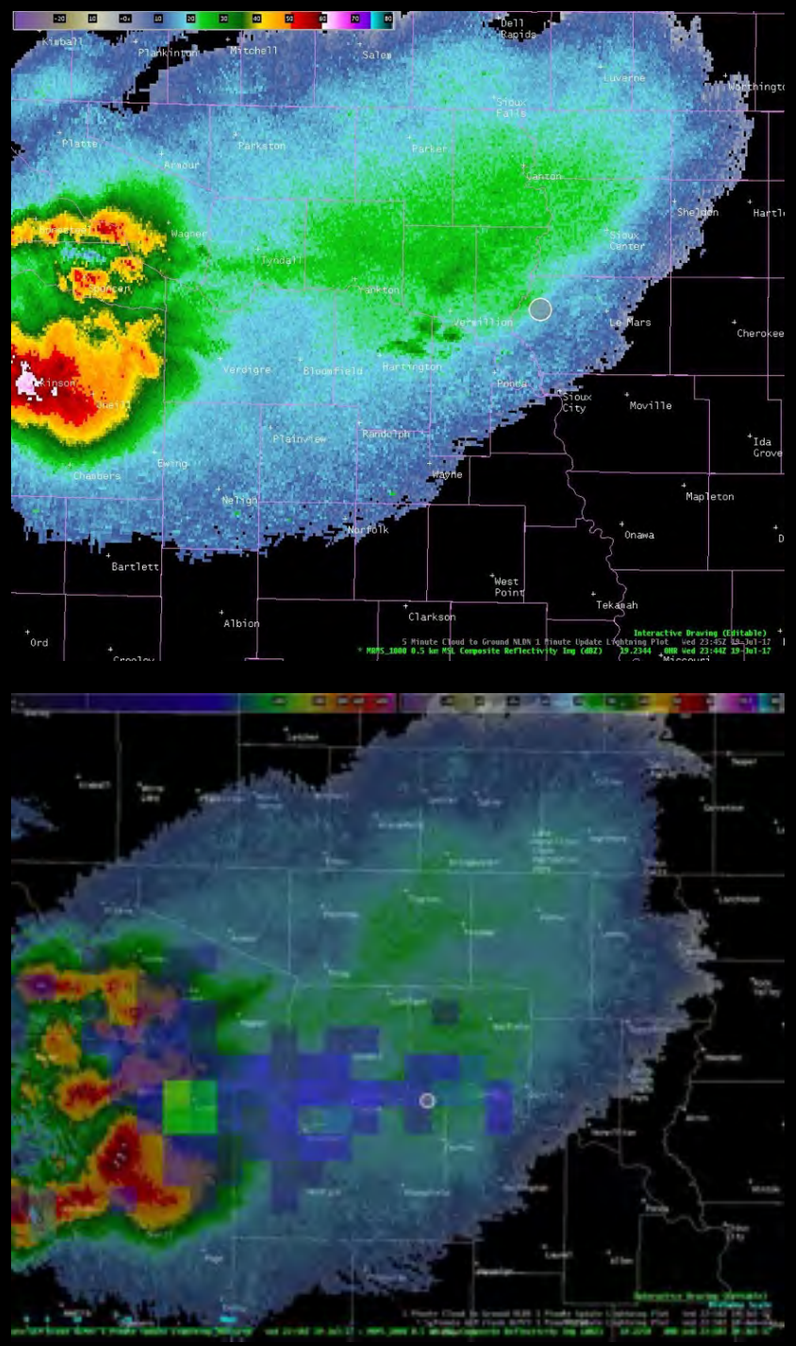
The projection differences result in
false gaps in 8 km gridding of the data,
while at 10 km this results in double counts to some pixels.
(9 km has both problems)

Now for the cool discoveries



ANVIL LIGHTNING

19 Jul 2017
Western Iowa



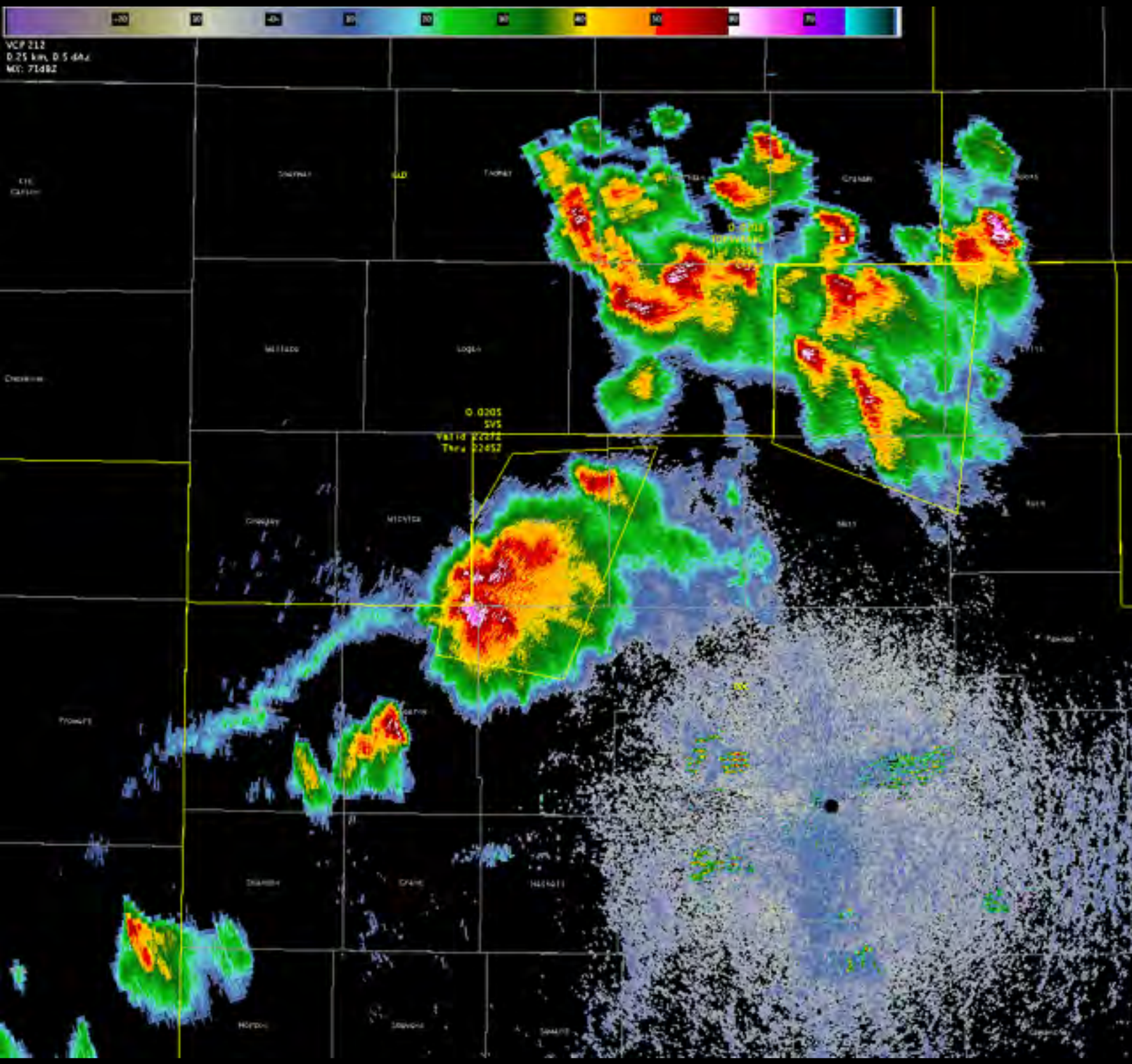
~120-150 km
from storm core

7 GLM Flashes
0 + Strikes
0 – Strikes

Bridgewater
Dolton
Clayton
Parkston
Marion
Parker
Freeman
Hurley
Tripp
Menno
Viborg
Scotland
Mayfield
Irene
Lesterville
Avon
Tyndall
Utica
Wakonda
Tabor
Mission Hill
Yankton
Gayville
Santee
Meckling
St. Helena
Niobrara
Crofton
Wynot
Eordyce

5 Minute Cloud to Ground NLDN 1 Minute Update Lightning Plot Wed 22:25Z 19-Jul-17
* 5 Minute GLM Flash GLMfl 1 Minute Update Lightning Plot Wed 22:25Z 19-Jul-17
km Grid Wed 22:25Z 19-Jul-17 + MRMS_1000 0.5 km MSL Composite Reflectivity Img (dBZ) 19.2224 0HR Wed 22:24Z 19-Jul-17

20 Jun 2017 ; Dodge City, KS



"In this example below, it was a bit difficult to use GLM to assess trends in convection since there was a large complex of storms with lightning being observed well away from the actual updrafts. New flashes were detected where new updrafts were developing to the SW of the main complex, but within the complex trends were difficult to assess."

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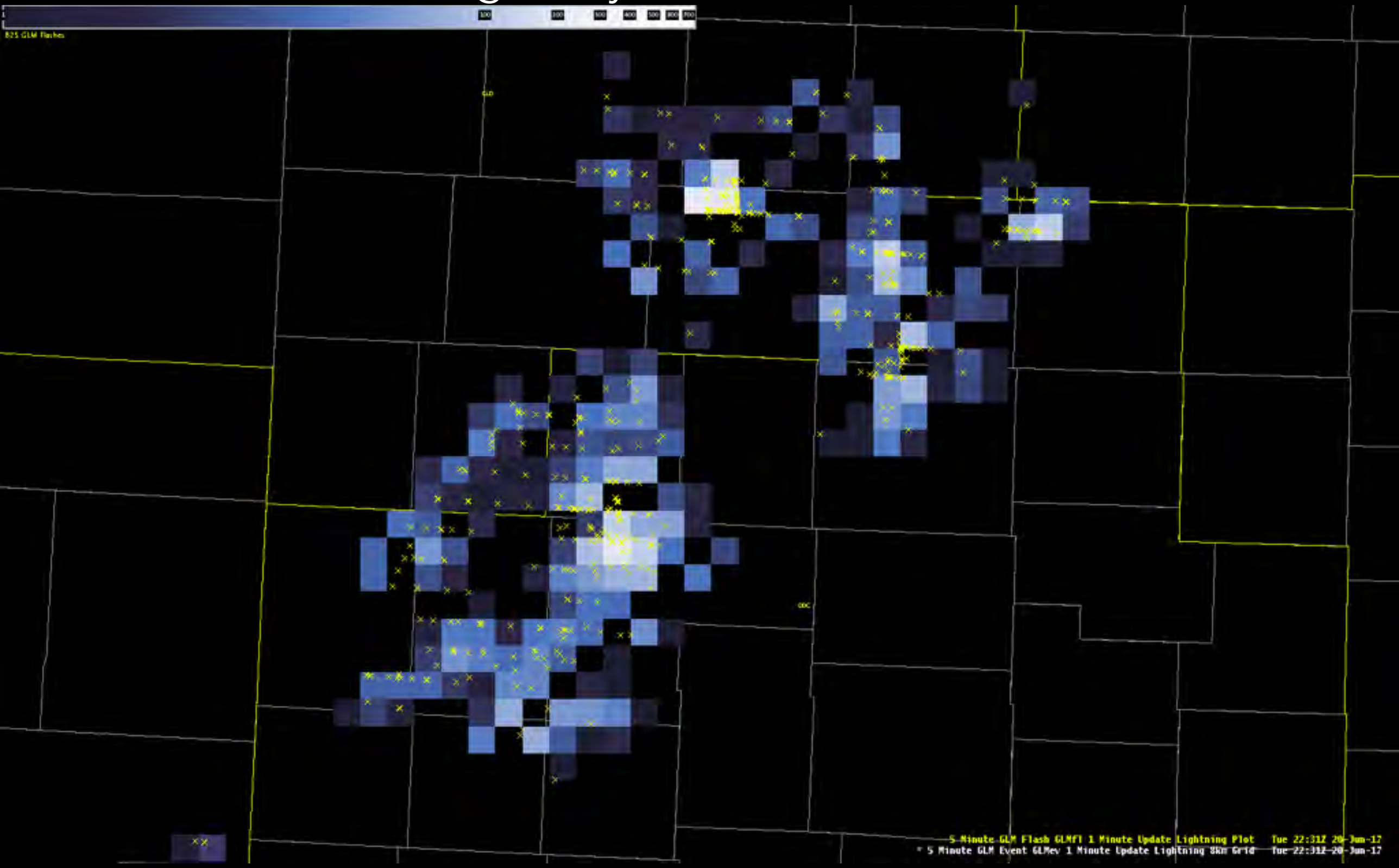

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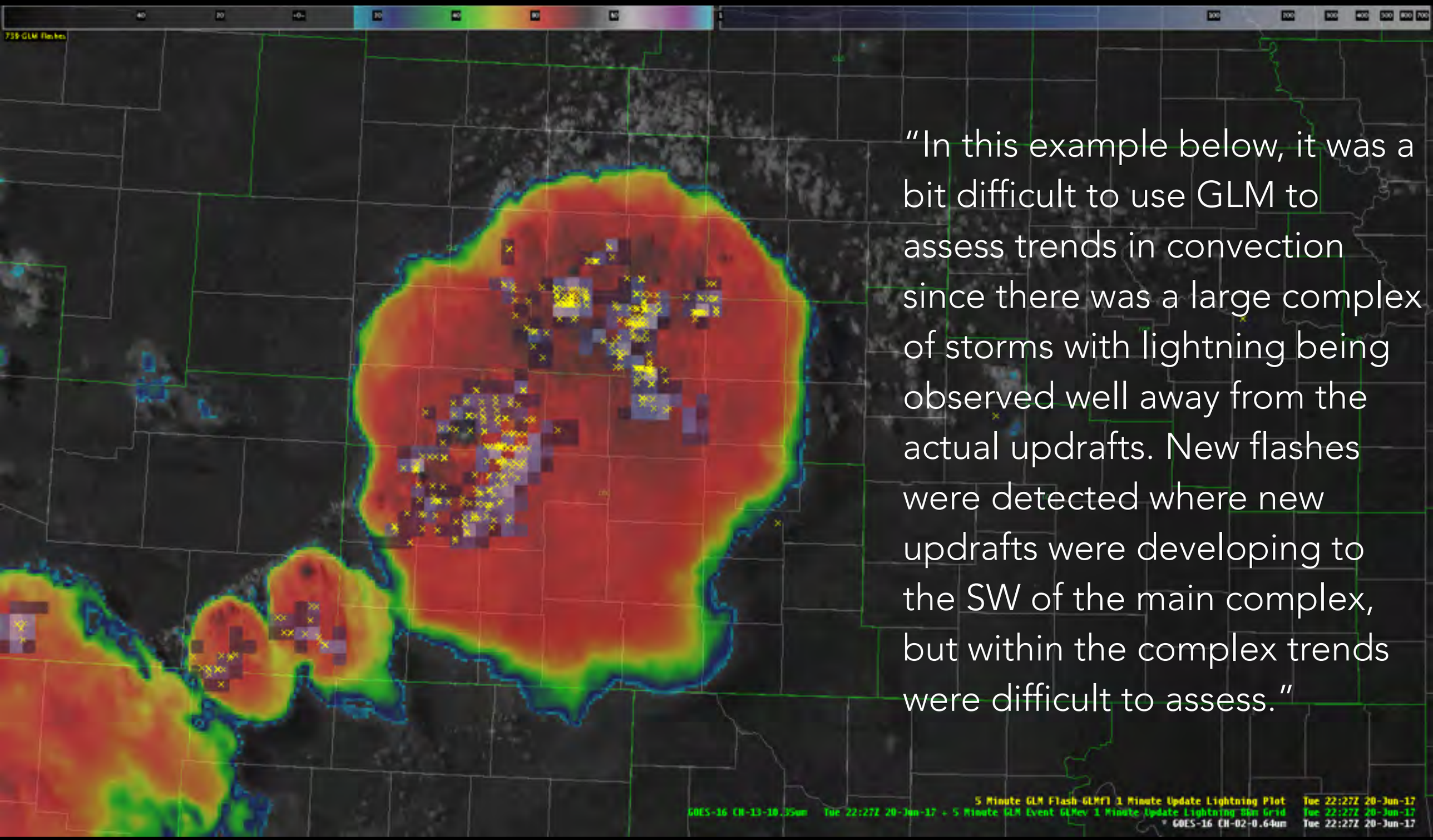

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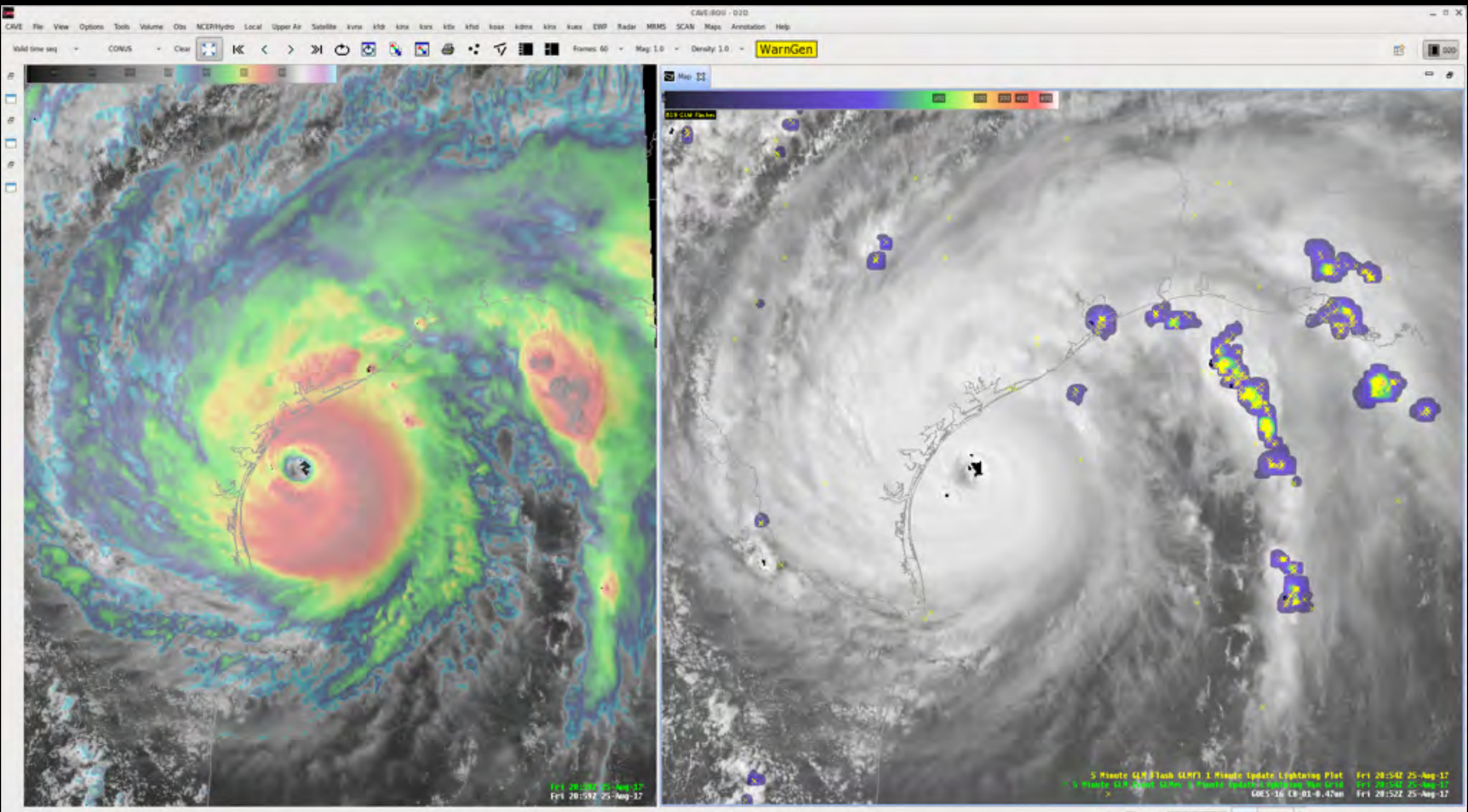
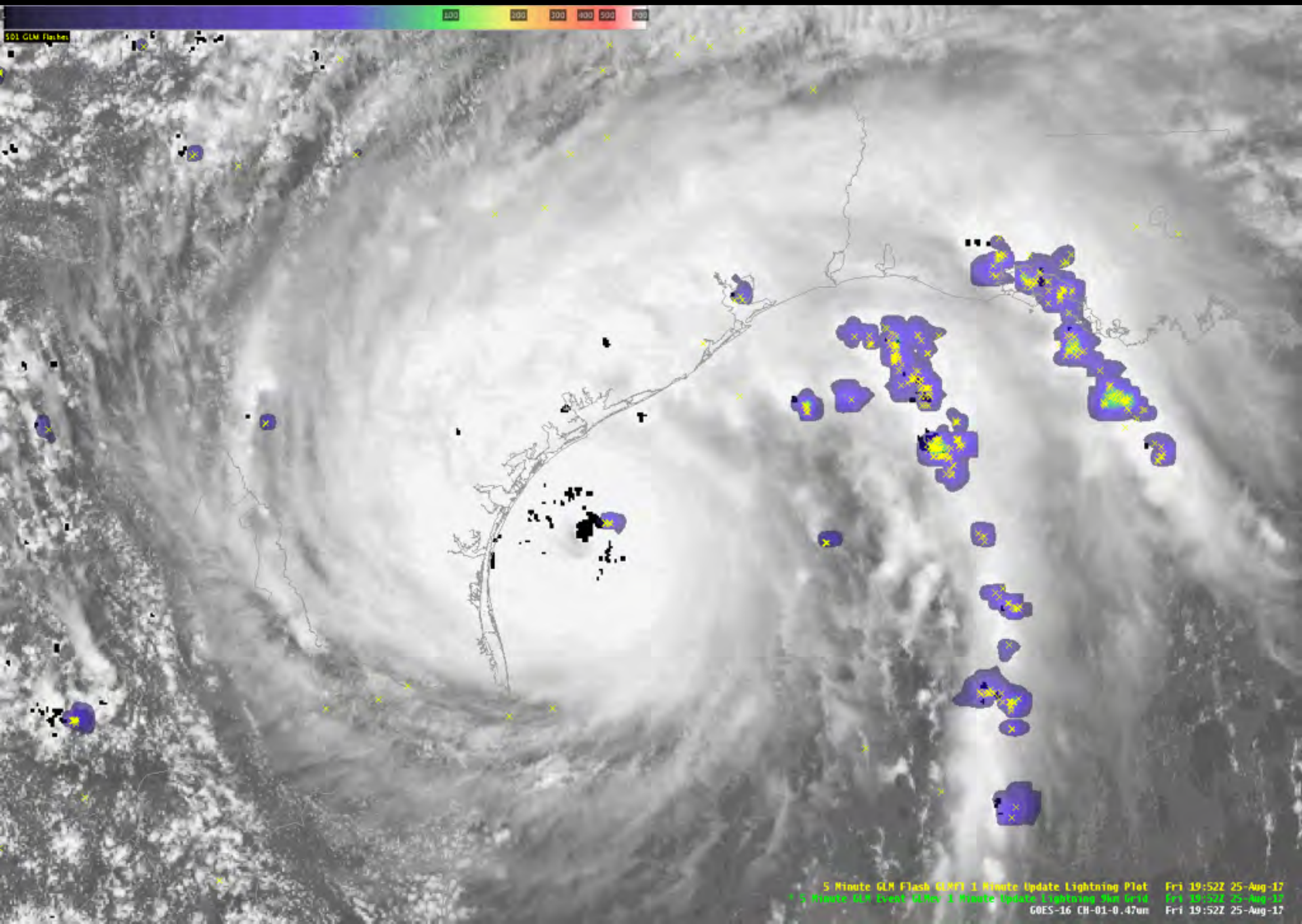
https://goesrhwt.blogspot.com/2017/06/glm-during-large-cluster-of-convection.html

HARVEY IN AWIPS




S01 GLM Flashes
100
200
300
400
500
700
5 Minute GLM Flash GLMf1 1 Minute Update Lightning Plot Fri 19:52Z 25-Aug-17
5 Minute GLM Event GLMev 1 Minute Update Lightning 9km Grid Fri 19:52Z 25-Aug-17
GOES-16 CH-01-0.47um Fri 19:52Z 25-Aug-17

- **Get the geolocation errors fixed before fielding**
- Native GLM resolution grids!
- Network comparison / QC / performance
- Forecasters will be confused between events, groups, and flashes
  - what each means and why they are useful
  - locally-focused training (SOOs)
- Need to be able to monitor trends
  - Time Series (click on storm)
  - Lightning Jump
- Spatial Extent was vitally important for lightning safety and understanding storm growth
- GLM had lead time over other networks' cloud-to-ground activity